

CLAIMS

What is claimed is:

1. A method of verifying that defect management area (DMA) information is properly generated in a recording and reproducing apparatus which records or reproduces information on or from an optical disc with DMA information, the method comprising:
generating as test information, defect management information, which is generated after performing initialization with certification on a test disc obtained by making known physical defects on a blank disc; and
verifying the test information using reference test information for the initialization with certification to provide a test result.
2. The method of claim 1, wherein the test information is a DMA mirror file.
3. The method of claim 1, wherein the generating comprises directly reading the test information from a DMA area on the test disc initialized with certification.
4. The method of claim 1, further comprising displaying the test result.
5. The method of claim 1, wherein the verifying comprises checking a DMA structure, a disc definition structure (DDS), a primary defect list (PDL) structure and a secondary defect list (SDL) structure, which form the test information, and checking whether PDL entries for a G1-list of physical defects known through certification exist.
6. The method of claim 1, wherein the verifying comprises:
verifying a structure of DMA of the test information;
verifying a disc definition structure (DDS) in the DMA;
verifying a primary defect list (PDL) structure in the DMA; and

verifying a secondary defect list (SDL) structure in the DMA.

7. The method of claim 6, wherein the verifying the DMA structure comprises checking an error condition, DDS/PDL and SDL update counters and contents of the DMA.

8. The method of claim 7, wherein:

the checking of the error condition comprises checking whether errors exist in any one of four DMAs, which is the DMA written in four positions on the test disc, two of which are located in a lead-in area and two of which are located in a lead-out area on the test disc;

the checking of the DDS/PDL update counters comprises checking whether the values of the DDS/PDL update counters in four DDSs and in four SDLs are "0," whether increments of the DDS/PDL counters representing a difference in the DDS/PDL update counters before and after the performing of the initialization with certification are "1," and whether the values of the eight DDS/PDL update counters are the same;

the checking of the SDL update counters comprises checking whether values of SDL update counters in the four SDLs are "0," whether increments of the SDL update counters representing a difference in the SDL update counters before and after the performing of the initialization with certification are "1," and whether the values of the four SDL update counters are the same; and

the checking of the contents of the DMA comprises checking whether the contents of the four DMAs are the same.

9. The method of claim 6, wherein the verifying of the DDS comprises checking a DDS identifier, a disc certification flag, a DDS/PDL update counter, a number of groups, a number of zones, a location of a primary spare area, and a location of a first logical sector number and a start logical sector number for each zone.

10. The method of claim 9, wherein:

the checking of the DDS identifier comprises checking whether the DDS identifier is a predetermined value;

the checking of the disc certification flag comprises checking whether a value of a bit indicating in-progress and a value of a bit indicating disc manufacturer certification are both "0b" and whether the value of a bit indicating user certification is "1b," in the disc certification flag;

the checking of the DDS/PDL update counter comprises checking whether the DDS/PDL update counter value is "0" and whether an increment of the DDS/PDL update counter representing a difference in the DDS/PDL update counter before and after the performing of the initialization with certification is "1";

the checking of the number of groups comprises checking whether the number of groups is a predetermined number;

the checking of the number of zones comprises checking whether the number of zones is a predetermined number;

the checking of the location of the primary spare area comprises checking whether first and last sector numbers of the primary spare area are predetermined sector numbers, respectively;

the checking of the first logical sector number comprises checking whether the location of the first logical sector number is determined based on a number of defects registered in the PDL; and

the checking of the start logical sector number comprises checking whether the start logical sector number for each zone is determined based on the number of defects registered in the PDL.

11. The method of claim 6, wherein the verifying of the PDL structure comprises checking a PDL identifier, a number of entries in PDL and an integrity of the PDL entries.

12. The method of claim 11, wherein the:

the checking of the PDL identifier comprises checking whether the PDL identifier is a predetermined value;

the checking of the number of entries comprises checking whether the number of entries in the PDL is the same as a number of defects registered in the PDL; and

the checking of the integrity of the PDL comprises checking whether the PDL entry type indicates a G1-list of defective sectors detected during user certification and checking corresponding defective sector numbers.

13. The method of claim 6, wherein the verifying of the SDL structure comprises checking an SDL identifier, an SDL update counter, a start sector number of a secondary spare area (SSA), a total number of logical sectors, a DDS/PDL update counter, a spare area full flag, a number of entries in the SDL, an integrity of the SDL entries, an un-used area, and reserved areas.

14. The method of claim 13, wherein:

the checking of the SDL identifier comprises checking whether the SDL identifier is a predetermined value;

the checking of the SDL update counter comprises checking whether the SDL update counter value is "0" and whether an increment of the SDL update counter representing a difference in the SDL update counter before and after the performing of the initialization with certification is "1";

the checking of the DDS/PDL update counter comprises checking whether the DDS/PDL update counter value is "0" and whether an increment of the DDS/PDL update counter representing a difference in the DDS/PDL update counter before and after the performing of the initialization with certification is "1";

the checking of the start sector of the SSA and the total number of logical sectors comprises checking whether the start sector number of the SSA and the total number of logical sectors are properly set according to the size of the SSA which is designated by a user;

the checking of the spare area full flag, the number of the entries of the SDL and the integrity of the SDL entries comprises checking whether the spare area full flag indicates that the secondary spare area is not full, whether the number of entries in the SDL is set to "00h" indicating that no entries exist, and whether information on the SDL entries does not exist; and

the checking of the un-used area and the reserved areas comprises checking a size of the un-used area of the SDL and whether the un-used area is a predetermined value, and whether the reserved areas are predetermined values.

15. The method of claim 1, wherein the recording and reproducing apparatus is a digital versatile disc-random access memory (DVD-RAM).

16. The method of claim 2, wherein the reference test information is a reference DMA mirror file.

17. The method of claim 16, wherein the reference DMA mirror file contains ideal data without errors.

18. The method of claim 8, wherein the checking whether errors exist in any one of the four DMAs comprises:

checking whether there are any uncorrectable errors in the four DMAs; and
determining the verification to be a failure if any uncorrectable error is found.

19. The method of claim 10, wherein the bit indicating in-progress in the disc certification flag is b7, the bit indicating user certification is b1, the bit indicating disc manufacturer certification is b0, and bits b6 through b2 of the disc certification flag are reserved bits, wherein the checking of the disc certification flag further comprises checking whether a value of each of the reserved bits is "0b".

20. The method of claim 12, wherein the verifying of the PDL structure further comprises:

checking whether an unused area of the PDL is a predetermined value.

21. The method of claim 14, wherein the verifying of the SDL structure further comprises:

checking whether an unused area of the SDL is a predetermined value.

22. A method of verifying whether defect management area (DMA) information is properly generated or updated in a recording and reproducing apparatus which records or reproduces information on or from an optical disc with the DMA information, the method comprising:

generating test information from the DMA information, which is generated after performing initialization with certification; and
executing a test for verifying the test information using reference test information.

23. The method of claim 22, wherein the test information is a DMA mirror file and the reference test information is a reference DMA mirror file.

24. The method of claim 22, wherein the executing the test comprises:
checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

25. The method of claim 10, wherein the verifying of the DMA structure further comprises:

checking whether remaining reserved areas in the DDS each have a predetermined value.

26. An apparatus for testing a recording and reproducing apparatus which records or reproduces information on or from a recordable and reproducible optical disc with defect management area (DMA) information to check whether the DMA information is properly generated, the apparatus comprising:

a modified drive unit generating test information from the generated DMA information of a test disc, which is obtained after the recording and reproducing apparatus performs initialization with certification on the test disc; and

a verifier comparing the test information with predetermined test information of the initialization with certification, to verify a test result.

27. The apparatus of claim 26, wherein the test information is a DMA mirror file and the predetermined test information is a reference DMA mirror file.

28. The apparatus of claim 26, wherein the modified drive unit reads the test information from a DMA area on the test disc and provides the test information to the verifier.

29. The apparatus of claim 26, wherein the test disc is a disc on which known physical defects are formed on a blank disc prior to the performing of the initialization with certification.

30. The apparatus of claim 26, wherein the verifier compares the test information with the predetermined test information by checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

31. A method of verifying whether a recording and reproducing apparatus reads and processes defect management area (DMA) information properly, comprising:

performing initialization with certification on a test disc containing predetermined known physical defect information, to generate test information; and

comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

32. The method of claim 31, wherein the performing of the initialization with certification comprises:

having the recording and reproducing apparatus perform the initialization with certification on the test disc, to generate a disc with the DMA information, and

reading only the DMA information from the disc using a reference drive, to generate a DMA mirror file as the test information;

wherein the reference test information is a reference DMA mirror file.

33. The method of claim 31, wherein the comparing comprises:

checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

34. A method of verifying whether a recording and reproducing apparatus reads and processes defect management area (DMA) information properly, comprising:

performing certification with reinitialization on a test disc containing predetermined known physical defects using the reproducing and recording apparatus to generate the DMA information;

generating test information from the generated DMA information; and

comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

35. The method of claim 34, wherein the comparing comprises:

checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

36. DMA information which is properly generated by a recording and reproducing apparatus using the process of:

- performing certification with reinitialization on a test disc using the reproducing and recording apparatus to generate the DMA information;
- generating test information from the generated DMA information; and
- comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

37. The DMA information of claim 36, wherein the DMA information comprises a structure of the DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) and a secondary list (SDL) structure of the DMA, wherein the comparing comprises:

- checking the structure of the DMA, the disc definition structure (DDS) of the DMA, the primary defect list (PDL) structure and the secondary list structure (SDL) of the DMA, which form the test information.

38. A recording and reproducing apparatus verified according to the process of: performing certification with reinitialization on a test disc to generate DMA information;

- generating test information from the generated DMA information; and
- comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

39. The recording and reproducing apparatus of claim 38, wherein the comparing the test comprises:

checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

40. A recording and reproducing apparatus verified according to the process of: performing initialization with certification on a test disc containing predetermined defect information to generate test information; and comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

41. The recording and reproducing apparatus of claim 40, wherein the comparing the test comprises:

checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

42. An apparatus for testing a recording and reproducing apparatus which records or reproduces information on or from a recordable and reproducible optical disc with defect management area information to check whether DMA information is properly generated, the apparatus comprising:

a modified driver generating test information based on the DMA information of a test disc generated by a reproducing device performing initialization with certification on the test disc; and

a verifier comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus.

43. The apparatus of claim 42, wherein the modified driver reads only the DMA information from the test disc, to generate a DMA mirror file as the test information;

wherein the reference test information is a reference DMA mirror file.

44. The apparatus of claim 42, wherein the verifier receives the reference test information from an external source to make the comparison between the test information and the reference test information.

45. The apparatus of claim 42, wherein the verifier compares the test information with the predetermined test information by checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

46. A method of manufacturing a compliant recording and reproducing apparatus, comprising:

manufacturing an uncertified recording and reproducing apparatus that updates and generates defect management area (DMA) information; and

verifying whether the uncertified recording and reproducing apparatus is compliant with a standard, said verifying comprising:

performing initialization with certification on a test disc to generate test information, and

comparing the test information with reference test information to determine a verification of the recording and reproducing apparatus, the verification indicating that the uncertified recording and reproducing apparatus is compliant with the standard.

47. The method of claim 46, wherein the comparing comprises:

checking a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

48. A disc recording and reproducing apparatus for recording and reproducing information on an optical disc, comprising:

- a light source to emit a light;
- a focusing element to focus the light onto the optical disc to record and reproduce the information; and
- a controller to control said light source, said controller being verified to update and generate defect management area (DMA) information by performing initialization with certification on a test disc to generate test information, and
- comparing the test information with reference test information to determine the verification of the recording and reproducing apparatus.

49. The disc recording and reproducing apparatus of claim 48, wherein the controller checks a structure of a DMA, a disc definition structure (DDS) of the DMA, a primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

50. A disc recording and reproducing apparatus for recording and reproducing information on an optical disc:

- a light source to emit a light;
- a focusing element to focus the light onto the optical disc for recording and reproducing the information; and
- a controller to control said light source and to update and generate defect management area information after performing initialization with certification on the optical disc so that the defect management information is compliant with a standard.

51. The disc recording and reproducing apparatus of claim 50, wherein the controller checks a structure of a DMA, a disc definition structure (DDS) of the DMA, a

primary defect list (PDL) structure and a secondary list (SDL) structure of the DMA, which form the test information.

52. An apparatus for testing a recording and reproducing apparatus which records or reproduces information on or from a recordable and reproducible optical disc with defect management area (DMA) information to check whether DMA information is properly generated, the apparatus comprising:

a modified drive unit generating test information from the DMA information recorded on the test disc, which is obtained after the recording and reproducing apparatus performs initialization with certification on a test disc obtained by making known physical defects on a blank disc; and

a verifier verifying a test result by verifying the test information using reference test information for initialization with certification.

53. The apparatus of claim 52, wherein the test information is a DMA mirror file.

54. The apparatus of claim 53, wherein the modified drive unit records the test information directly from a DMA area on the test disc initialized with certification.

55. The apparatus of claim 52, wherein the verifier checks a DMA structure, a disc definition structure (DDS), a primary defect list (PDL) structure and a secondary defect list (SDL) structure, which form the test information, and checks whether PDL entries for a G1-list of physical defects known through certification exist.

56. The apparatus of claim 55, wherein the verifier checks the DMA structure by checking an error condition of the DMA, DDS/PDL and SDL update counters and contents of the DMA.

57. The apparatus of claim 56, wherein the verifier checks whether errors exist in any of four DMAs, which is the DMA written in four positions on the test disc, two of which are located in a lead-in area and two of which are located in a lead-out area on the test disc, whether values of the DDS/PDL update counters in four DDSs and in four SDLs are "0," whether increments of the eight DDS/PDL update counters representing a difference in the DDS/PDL update counters before and after the performing of the initialization with certification are "1," whether the values of the eight DDS/PDL update counters are the same, whether values of the SDL update counters in the four SDLs are "0," whether increments of the SDL update counters representing a difference in the SDL update counters before and after the performing of the initialization with certification are "1," whether the values of the four SDL update counters are the same, and whether contents of the four DMAs are the same.

58. The apparatus of claim 55, wherein the verifier checks the DDS by including a DDS identifier, a disc certification flag, a DDS/PDL update counter, a number of groups, number of zones, a location of a primary spare area, a location of a first logical sector number and a start logical sector number for each zone.

59. The apparatus of claim 58, wherein the verifier checks whether the DDS identifier is a predetermined value, whether a value of a bit indicating in-progress and a value of a bit indicating disc manufacturer certification are both "0b" in the disc certification flag, whether a value of a bit indicating user certification is "1b" in the disc certification flag, whether the DDS/PDL update counter value is "0," whether an increment of the DDS/PDL update counter representing a difference in the DDS/PDL update counter before and after the performing of the initialization with certification is "1," whether the number of groups and the number of zones are predetermined numbers, respectively, whether the first and last sector numbers of the primary spare area are predetermined sector numbers, respectively, whether the location of the first logical sector number is determined based on a number of defects

registered in the PDL, and whether the start logical sector number for each zone is determined based on the number of defects registered in the PDL.

60. The apparatus of claim 55, wherein the verifier checks the PDL structure by checking a PDL identifier, a number of entries in the PDL and an integrity of the PDL entries.

61. The apparatus of claim 60, wherein the verifier checks whether the PDL identifier is a predetermined value, whether the number of entries in the PDL is the same as a number of defects registered in the PDL, and whether the PDL entry type indicates a G1-list of defective sectors detected during user certification, and checks corresponding defective sector numbers.

62. The apparatus of claim 55, wherein the verifier checks the SDL structure by checking an SDL identifier, an SDL update counter, a start sector number of a secondary spare area (SSA), a total number of logical sectors, a DDS/PDL update counter, a spare area full flag, a number of entries in SDL, and an integrity of the SDL entries.

63. The apparatus of claim 62, wherein the verifier checks whether the SDL identifier is a predetermined value, whether the SDL update counter value is "0" and whether an increment of the SDL update counter representing a difference in the SDL update counter before and after the performing of the initialization with certification is "1," whether the DDS/PDL update counter value is "0," whether an increment of the DDS/PDL counter representing a difference in the DDS/PDL update counter before and after the performing of the initialization with certification is "1," whether the start sector number of the SSA and the total number of logical sectors are properly set according to a size of the SSA which is designated by a user, whether the spare area full flag indicates that the secondary spare area is not full, whether the number of entries in the SDL is set to "00h" indicating that no entries exist, and whether information on the SDL entries does not exist.